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Induced mutagenesis in vegetatively propagated horticultural crops

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Mutation breeding is envisaged as a complementary to conventional breeding due to the existence of polyploidy, crossing barriers, poor seed set and germination. Hence induced mutagenesis has become one of the accepted tools to improve the economic traits of the crop plants especially in vegetatively propagated crops like Cassava, Anthurium, Orchids, *Coleus forskohlii* and etc. As a result of following mutagenic treatments, a mixed bag of unexpected miracles of induced variations has been achieved in an array of horticultural crops (Chopra, 2005). Achievement during recent years in this field has highlighted the utility and usefulness of mutation breeding in crop improvement (Mishra *et al.*, 2006).

Induced mutagenesis in vegetatively propagated crops :

Zhao Shirong (2002) documented that mutation breeding of vegetatively propagated plants have their unique advantages compared with other kind of crops and other breeding methods. Firstly, the variation frequency increased greatly; which can be of hundred or thousand times higher than natural frequency. Secondly the target mutation appeared, the variation could be rapidly stabilized by vegetative propagation methods to speed up the selection process.

Plant material :

According to breeding targets, three principles were followed to choose plant materials in radiation breeding: (1) choose plant materials with comprehensive good characters and with only one or two defects; (2) choose plant materials with high genetic heterozygosity; (3) choose plant materials having genotypes which were easy to induce gene mutations.

Choice of mutagens :

The relative frequency of mutations and chromosomal aberrations can be influenced by choosing among different mutagens namely gamma rays, ethyl methane sulphonate (EMS), X-rays, neutrons etc. The choice of mutagen to be made mostly depends upon the breeding material to be used and objective. In palmarosa, Srivastava and Satpute (1998) stated that the combination of gamma rays (15 kR) + EMS (0.4 %) exhibited higher herbage yield in terms of plant height, second internode length, inflorescence length, leaf number, tiller number, oil yield and free gereniol percentage over the untreated control.

Zhao Shirong (2002) stated that gamma rays was the most commonly used mutagen to induce mutations in fruit trees, ornamental plants, medicinal and aromatic plants, in the past decades of radiation breeding practice in China. So far, the released mutant cultivars of fruit trees and ornamental plants in China were developed by irradiation with gamma rays. Similarly, Wang *et al*. (2006) also opined that gamma rays were effective in creating mutants and have been successfully used in generation of new crop varieties.

Radiation dose :

The dose to be used obviously depends upon the sensitivity of the material used for irradiation, plant part and the stage of development. Use of high dose of radiation has not been recommended for vegetatively propagated plants.

Zhao Shirong (2002) and Velmurugan (2007) also reported that